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VEHICLE PANEL WITH METALIZED FILM

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates in general to a vehicle panel structure, and in particular to a vehicle panel structure that includes a core layer and a layer of metalized film to provide the vehicle panel structure with improved thermal properties.

Description of the Related Art

[0002] Typically, a vehicle panel, such as a headliner, includes an air gap between the vehicle roof and the headliner to provide a thermal barrier between the vehicle roof and the headliner. Unfortunately, one problem associated with the necessity of this air gap is that the overall distance between the vehicle roof and the headliner is increased.

SUMMARY OF THE INVENTION

[0003] The inventor of the present invention has recognized these and other problems associated with conventional vehicle panels, and have developed a vehicle panel comprising a core layer and a layer of metalized film. The layer of metalized film eliminates the need for an air gap between two layers of material, such as a vehicle roof and a headliner, thereby minimizing the thickness of the vehicle panel while improving thermal performance of the vehicle panel structure. Thus, the vehicle panel of the invention comprises a core layer, and a layer of metalized film bonded to the core layer. Preferably, the material for the core layer is compatible with the material for metalized film such that the metalized film is bonded to the core layer with the application of heat. Alternately, a bonding agent may be applied to either the core layer or the metalized film that is compatible to the materials used for the core layer and the metalized film to form the appropriate bond between the core layer and the metalized film upon the application of heat.

[0004] A method of manufacturing the vehicle panel comprises the steps of positioning the core layer on a surface of a mold half, and positioning the metalized film on the surface of the other mold half. After placing the core layer and the metalized film, heat is applied to either the core layer or the metalized film by heating the core layer or heating the mold half with the metalized film for a predetermined temperature. Then, the mold halves are closed to press the core layer against the metalized film for a predetermined period of time. As the metalized film is heated, the metalized film becomes formable and is bonded to the surface of the core layer to form the vehicle panel. The mold halves are then opened and the vehicle panel is removed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] In the drawings:

[0006] The Figure shows a cross-sectional view of a vehicle panel structure including a core layer and a layer of metalized film according to an embodiment of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

[0007] Referring now to the Figure, a vehicle panel 10 is shown according to an embodiment of the invention. The vehicle panel 10 includes a core layer 12 and a layer of metalized film 14 bonded to the core layer 12. Optionally, the vehicle panel 10 may include a second layer of metalized film or suitable material (not shown), such as a fabric, bonded or otherwise attached to the opposite surface of the core layer 12.

[0008] The core layer 12 may be made of any desirable material. Preferably, the core layer 12 is comprised of any suitable material having insulating properties. For example, the core layer 12 may comprise a foam material, such as polypropylene or the like, and have a density and thickness that may vary depending on the design requirements.

[0009] The metalized film 14 may be made of any type of material that is capable of reflecting heat, such as polyethylene terepthalate (PET) or the like. Preferably, the material used for the metalized film 14 is compatible with the material used for the

core layer 12 such that the metalized film 14 can form a bond with the core layer 12. One suitable material for the metalized film 14 is commercially available under the trade name METALLYTE™ MET available from ExxonMobil Chemical. The metalized film 14 contains a polymer material, such as polypropylene or the like, that is compatible with the material for the core layer 12. In addition, the metalized film 14 is coated with a metallic material, such as aluminum or the like, that has excellent heat reflection properties.

[0010] Ideally, the metalized film 14 is bonded to the outer surface of the core layer 12 that is nearest the source of heat to be reflected by the vehicle panel 10. If necessary, a second layer of metalized film 14 or other suitable material can be applied to an opposite surface of the core layer 12 in situations where the source of heat is emanating from opposite sides of the core layer 12. However, in most situations, the core layer 12 is exposed to only one heat source, and therefore only one layer of metalized film 12 is required for adequate heat reflection.

[0011] For example, the core layer 12 with metalized film 14 can be used as a headliner of a vehicle. In this example, the source of heat (indicated by the arrows in the Figure) would be the vehicle roof so the metalized film 14 would be applied to only one surface of the core layer 12 that is nearest the vehicle roof. It has been found that when the core layer 12 with metalized film 14 positioned nearest the vehicle roof is used as a headliner that the headliner exhibits superior heat reflection and heat absorption properties, as compared to conventional headliners that require the air gap between the headliner and the vehicle roof for insulation. Thus, the vehicle panel 10 comprising the core layer 12 with metalized film 14 eliminates the need of an air gap. As a result, the vehicle panel 10 when used as a headliner requires less real estate (i.e. has less thickness) as compared to conventional headliners with an air gap.

[0012] A method for manufacturing the vehicle panel 10 will now be described. Typically, a mold tool (not shown) includes two mold halves. It is understood that the mold halves have complimentary shapes in the shape of the vehicle panel to be formed. The core layer 12 is positioned in one mold half using conventional means. The metalized film 14 is positioned on the other mold half using conventional means, such as tenured, pinned, clamped, vacuumed, or the like, in a manner known in the

art. The core layer 12 is then heated to a predetermined temperature, such as approximately 400 degrees Fahrenheit to cause the core layer 12 to be in a somewhat molten state. The mold halves are then closed together to press the core layer 12 in engagement with the metalized film 14 for a predetermined period of time, such as approximately 30 seconds. When the mold halves are pressed together, some of the heat from the core layer 12 is transferred to the metalized film 14 such that the metalized film 14 becomes formable and molded to the shape of the core layer 12. The source of heat being transferred to the metalized film 14 can be from other sources of heat, such as the mold tool itself, rather than from the core layer 12.

[0013] It should be noted that the topography of the core layer 12 and the vehicle panel 10 is non-flat. In these cases, it has been found that the metalized film 14 may become wrinkled in locations where the core layer 12 may have a non-flat topography. However, the metalized film 14 having a substantially flat surface before being placed in the mold half still provides an acceptable bond to the entire surface of the core layer 12 because the metalized film 14 is placed in the mold half with enough tolerance to substantially conform to the topography of the core layer 12 and the vehicle panel 10 being formed.

[0014] While the invention has been specifically described in connection with certain specific embodiments thereof, it is to be understood that this is by way of illustration and not of limitation, and the scope of the appended claims should be construed as broadly as the prior art will permit.